Middeck/EXPRESS Sub-Rack Payload Processing Flow

(Why we do that crazy thing we do)

Utilization IPT Meeting
March 8, 2002

Johnny Mathis NASA/KSC/UB-E1 407-867-5869 fax:407-867-7282 Johnny.Mathis-1@ksc.nasa.gov

Middeck vs. EXPRESS Flow

- Middeck/EXPRESS Sub-Rack Payloads have become almost synonymous now that ISS has begun to be responsible for the majority of the manifest
- In reality, the terms mean totally different things
  - Middecks are payloads which are located in the Middeck area of the Orbiter
  - EXPRESS Sub-Rack Payloads are items which are located in an EXPRESS Rack within the ISS
- The confusion is created because many of the items destined for an EXPRESS Rack within the ISS are actually launched in the Orbiter Middeck
  - This could be driven by time criticality, or in the case of 8A, simply because there is no MPLM available.
  - The EXPRESS Rack mimics the attach points of the Middeck for just this reason
- All of this means that the terms are being used interchangeably, but this is only being done to confuse you
  - Payloads can, and do every mission, fly in the middeck which are not even part of ISS
  - Payloads can go up in the MPLM for installation into an EXPRESS Rack and never see the middeck
- The majority of the Utilization team will never see a middeck which is not also an EXPRESS Sub-Rack Payload
  - The exception to this being the team supporting middeck late stow

Johnny Mathis NASA/KSC/UB-E1 407-867-5869 fax:407-867-7282 Johnny.Mathis-1@ksc.nasa.gov

Middeck vs. EXPRESS Flow

- EXPRESS Sub-Rack Payloads are delivered for PTCS testing several months prior to launch depending on the specific mission schedule
  - Sometimes this is early enough to support an MPLM flow, sometimes it is much later
  - In all cases, we don't want to be too close to launch or we won't have enough time to fix significant issues
- Upon completion of PTCS testing, payloads are either installed in the MPLM, or…..
- The payload is returned to the Payload Developer (PD)
  - Huh? Didn't we just test it for flight?
  - How do we know it won't get damaged?
  - What about configuration control and a million other concerns?
- The answer is that the payload was returned so the PD could prepare the payload for launch in the Orbiter middeck, including time critical operations
  - The PD has responsibility for hardware control after being returned by KSC
  - This is no different than before it arrived at KSC the first time
  - Any updates should be documented in the IDP when the payload is returned to KSC
- The payload may physically stay off-line at KSC or be shipped off-site
- The payload is turned back over to KSC for installation into the middeck anywhere from 10 days to 19 hours prior to flight depending on science requirements

Johnny Mathis NASA/KSC/UB-E1 407-867-5869 fax:407-867-7282 Johnny.Mathis-1@ksc.nasa.gov

SPACE STATION PAYLOADS
MIDDECK EXPERIMENTS

KSC PLANNING
(CONTINUOUS)

- REQUIREMENTS MANAGEMENT
- PROCEDURE DEVELOPMENT
- SCHEDULE DEVELOPMENT

PAYLOAD CUSTOMER ACTIVITIES

L - 2 MONTHS

MIDDECK EXPERIMENT ON DOCK KSC

- RECEIVING & INSPECTION

CEIT
(AS REQUIRED)

- ORBITER FIT CHECKS

TEST AND CHECKOUT OPERATIONS
(IF REQUIRED)

- PTCS PRE-TEST PREPS/ORT
- EXP INSTL INTO EXPRESS RACK FCU
- ELECTRICAL CABLE CHECKS
- EXPERIMENT PREPS
- EXPERIMENT TESTING
- EXP REMOVAL FROM EXPRESS RACK FCU

SHIP MIDDECK EXPERIMENT TO PAYLOAD CUSTOMER

SSPF / O&C / HANGAR L PROCESSING

L - 2 WEEKS

MIDDECK EXPERIMENT ON DOCK KSC

- RECEIVING & INSPECTION

EXPERIMENT OFFLINE PROCESSING

- POST SHIPMENT HEALTH CHECKS
- FLIGHT CABLE FIT CHECK (AS REQ'D)
- PAYLOAD MOUNTING PANEL INSTALLATIONS (AS REQ'D)
- BOND CHECKS
- SHARP EDGE INSPECTION (AS REQ'D)
- PREPS FOR FLIGHT

EXPERIMENT TURNOVER OPERATIONS

- TURNOVER TO KSC
- SWITCH TO BATTERY POWER (AS REQ'D)
- EXP CLEANING
- WEIGHT AND CG OPS (AS REQ'D)
- EXP PACKAGING FOR TRANSPORT

TRANSPORT TO PAD

ORBITER INTEGRATED OPERATIONS

- TRANSFER TO USA
- EXPERIMENT INSTALLATION
- BOND CHECKS
- SWITCH TO ORBITER POWER/IVT (AS REQ'D)
- CLOSEOUT PHOTOS

LAUNCH

EXP ON ORBIT

LANDING

- SWITCH TO BATTERY POWER (AS REQ'D)
- MIDDECK REMOVALS
- TRANSFER FROM USA
- TRANSPORT TO OFFLINE LAB

OFFLINE LAB OPERATIONS

- SWITCH TO FACILITY POWER (AS REQ'D)
- TURNOVER TO PAYLOAD CUSTOMER